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May 12, 2014

Via Electronic Comments Filing System

Federal Communications Commission
Attention: Ms. Marlene Dortch, Secretary
445 12th Street NW
Washington, DC 20554

Re: Wireless E911 Location Accuracy Requirements – PS Docket No. 07-114

Dear Chairman Wheeler and Commissioners:

As a member of the emergency medical community, I urge you to press forward with indoor location accuracy requirements for wireless carriers to ensure the rapid location of persons in need of life-saving medical assistance.

Statement of Interest

I am the Medical Director of the Santa Barbara County and Ventura County, California Emergency Medical Services (EMS) systems with a combined population of 1.3 million. Both EMS systems are top-tier performers in the Cardiac Arrest Registry to enhance Survival (CARES) and have been recently awarded the highest recognition from the American Heart Association's Mission Lifeline for heart-attack care. I also am the Associate Medical Director of an aeromedical service and former Chair of the California Commission on Emergency Medical Services. I have been an Emergency Medical Physician since 1982, and am certified by the American Board of Emergency Medicine in both Emergency Medicine and the subspecialty of Emergency Medical Services.

My experience over the last 32 years has impressed upon me the criticality of rapidly locating persons who need medical assistance and delivering that medical assistance quickly. Unfortunately, I have seen too many cases when delays in the system caused or contributed to the loss of life.

Relationship of EMS Response Times to Patient Outcome

Emergency Medical Services (EMS) systems are built on the foundation that prompt response, early treatment, and rapid transportation to the most appropriate hospital are essential to maximizing the likelihood of surviving life-threatening illness or injury. Over the years, improvements in personnel training, ambulance deployment, and medical treatments have strengthened EMS systems and improved patient outcomes.

The cornerstone of an EMS system is 9-1-1. The system is activated by the prompt recognition of an emergency medical condition, dispatch of appropriate personnel, and providing, when appropriate, medical care instructions over the telephone. However, all of this is threatened by the inability of 9-1-1 dispatchers to rapidly and accurately determine the location of a caller on a wireless phone.

The most well recognized clinical condition that requires a rapid response, and where seconds count, is Sudden Cardiac Arrest (SCA). SCA kills over 300,000 people in the United States each year. There are two treatments known to be effective for SCA: CPR and defibrillation; the application of an electrical shock to the heart. In order to be effective, these must be done as soon as possible after the patient collapses; survival decreases by 7-10% each minute the patient waits for defibrillation.¹

The Valenzuela study compared the collapse-to-defibrillation interval in 2000 cases of SCA, and found that if cardiopulmonary resuscitation (CPR) is started within 5 minutes of collapse and defibrillation is performed within 10 minutes, the patient has a 37% chance of surviving.² However, if neither occurs, the likelihood of survival is virtually zero.

There are numerous medical emergencies in addition to SCA where patients benefit from immediate activation of the EMS system and prompt response of emergency personnel. Examples include upper airway obstruction (choking), acute severe asthma, and anaphylaxis (allergic reaction).

For injured patients, the time interval between injury and arrival to the hospital or trauma center is important to survival. The concept of the "Golden Hour" was created to emphasize that every minute is important in locating and transporting the patient to the hospital for rapid evaluation and possible surgery. For certain critical injuries, such as penetrating wounds to the chest, the time to treatment must be *much shorter* than one hour.³

¹ Larsen MP, Eisenberg MS, Cummins RO, Hallstrom AP: *Predicting survival from out-of-hospital cardiac arrest: a graphic model.* Ann Emerg Med. 1993 Nov; 22(11):1652-8.

² Valenzuela TD, Roe DJ, Cretin S, et al: *Estimating effectiveness of Cardiac Arrest Interventions: A logistic regression survival model.* Circulation. 1997;96:3308-13.

³ Frezza EE, Mezghebe H: *Is 30 minutes the golden period to perform emergency room thorotomy (ERT) in penetrating chest injuries?* J Cardiovasc Surg (Torino) 1999 Feb;40(1):147-51.

In order to achieve the short time intervals necessary to save lives, immediate and accurate location determination is essential. We have developed an impressive medical system of knowledge, expertise and technology for saving lives. A less-accurate or delayed location determination system prevents the effective access to that emergency medical system, vitiating its purpose. Using less than the best location accuracy technologies would have the following effects on an EMS system:

1. It will result in a delay in the dispatch of emergency responders. With a wireline phone or a wireless phone with accurate location determination technology, the dispatcher will know quickly the exact location of the caller. With wireless 9-1-1 calls, for example, landmarks are often used, and it can be much quicker to know that there is only one "McDonalds" or "7-11" within the boundary of possible locations.

2. It will result in a delay in dispatchers being able to give telephone medical care instructions. 9-1-1 dispatchers are trained to give instructions over the phone to callers. Many of these can make the difference between life and death. Examples are abdominal compressions (Heimlich Maneuver) for choking victims and CPR for those suffering SCA. Dispatcher CPR instructions doubles the rate of bystander CPR.⁴ However, the call-taker must verify the caller's location before starting the instructions so emergency responders can be dispatched. Delays in confirming location, which will certainly be greater with less accurate location determination technology, will further delay the instructions.

3. It will increase the time it takes for emergency responders to locate and treat the victim. For outdoor, and even more so indoor, locations imprecise location (correct building, general area of the building, floor, room) information delays response.

4. It will extend the time from serious illness or injury to definitive treatment in the hospital. Illnesses such as SCA can be treated by on-scene by emergency personnel. However, there are a large number of emergency conditions that cannot be effectively treated until the patient arrives in a hospital. Examples are stroke, heart attack, and most serious traumatic injuries. Extending the time it takes to locate a these patients can easily threaten their lives.

5. It will unnecessarily occupy EMS resources and thereby delay responses to other emergency medical events.

EMS systems are designed to be prepared to respond not only to calls that *do* occur, but to calls that *might* occur. Time sent locating the patient is time that emergency vehicle is not prepared to respond to another emergency call. Many EMS calls and subsequent deaths occur because the normally closest vehicle was not available.

⁴ Rea T, Eisenberg MS, Culley LL, Becker L: *Dispatcher-Assisted Cardiopulmonary Resuscitation and Survival in Cardiac Arrest*. Circulation. 2001;104:2513-2516.

It is clear that: (1) there is a strong association between time to treatment and patient outcome in life-threatening emergency medical conditions, and (2) if a less accurate or delayed location determination technology is deployed, it will further slow EMS responses - and patients will suffer.

Proposed 30-second Requirement for Location Fix

The FCC's proposed 30-seconds requirement is far too lengthy an interval and the technologically feasible 10-second limit is more appropriate. The FCC should institute a 10-second Time to First Fix (TTFF) for routing purposes and an accurate location, indoors or outdoors, within 15 seconds. These are feasible with current technologies. Here are the medical reasons why these times are vital:

1. Without immediate location information it is impossible to reliably route a wireless 9-1-1 call to the most appropriate local PSAP. PSAPs have a well-defined jurisdiction with which the call takers and dispatchers are intimately familiar. With local knowledge a call taker can quickly determine a caller's location, dispatch responders, and provide telephone medical care instructions. If the location of the caller is not known for 30 seconds then the call must be either be routed to the "best guess" PSAP or a regional PSAP, neither of which will have the local knowledge, which can result in delay or errors in caller location. In addition, it is likely this alternate or regional PSAP will not be able to dispatch emergency responders, so that will necessitate a transfer, increasing the potential for dropped call, hang-up or other tragic error. 9-1-1 call transfers are a well-known source of error and every effort is made to minimize them. Further, callers often get confused and more anxious with multiple call takers and calls can be disconnected. As an example, this system is in place in California today; wireless 9-1-1 calls are frequently routed to regional PSAPs where callers are interrogated and transferred to the appropriate local PSAP. This results in delays in dispatch and in providing telephone instructions.

2. For some medical conditions 30 seconds may mean the difference between life and death. Complete airway obstruction (choking) and sudden cardiac arrest are two examples where a delay of 30 seconds is life threatening. If survival from Sudden Cardiac Arrest decreases by 10% for each minute of delay to care then a 30 second delay would reduce survival by 5%.

3. The likelihood of a hang-up or loss of cell coverage increases. The location of an emergency (along with type) is one of two essential attributes to every 9-1-1 call, and a delay in obtaining that general information (which will then need further clarification by the caller) increases the potential for a delay or no response.

Conclusions of the Salt Lake City Study and the Cardiac Study

The *Salt Lake City Study* and the *Cardiac Study* cited in the Proposed Rules clearly indicate that avoiding mistakes in routing 9-1-1 calls and quickly locating the subjects of the 9-1-1 calls are essential. These studies are well done and have reached reasonable conclusions. An additional study with similar results was published in 2011. In an analysis of 7,760 urban EMS high-priority emergency responses to adult patients, mortality risk increased linearly from 5% with a 4-<5 minute response interval to nearly 10% with an 8-<9 minute response interval. As discussed in the Blanchard study on EMS response times and mortality in urban areas (attached as Appendix A), patients suffered a 35% greater mortality rate when the response was greater than 4 minutes compared to less than 4 minutes.⁵

Indoor Location Accuracy

The FCC accurately points out that: (1) wireless 9-1-1 calls from indoor locations are increasing in frequency, and (2) locating an indoor caller is more difficult for emergency responders. These alone are strong arguments in support of the proposed 50-meter accuracy requirement. Most of the truly time-critical medical emergencies occur indoors. **Approximately 75% of sudden cardiac arrest occurs at home and a large proportion of the others occur in an indoor public location.**⁶ More vulnerable populations are more often indoors. The elderly, disabled, and those with medical illnesses are far more likely to be indoors when they experience an emergency situation.

Conclusion

Strong medical evidence supports the rapid adoption and implementation of the indoor location accuracy requirements proposed by the FCC. Since the technologies exist now to do so, the timeframes for implementation should not be lengthened, and to do so will cause unnecessary loss of life. Moreover, the FCC should require existing technologies for a 10-second TTFF for routing purposes and the delivery of an accurate location within 15 seconds. The 30-second requirement is too long for EMS and 9-1-1 purposes.

Thank you for your consideration of these important factors.

Sincerely yours,



Angelo Salvucci, MD, FACEP

⁵ Blanchard IE, Doig CJ, Hagel BE et al: *Emergency medical services response time and mortality in an urban setting*. Prehosp Emerg Care. 2012 Jan-Mar;16(1):142-51.

⁶ Iwami, T et al. *Outcome and characteristics of out-of-hospital cardiac arrest according to location of arrest: A report from a large-scale, population-based study in Osaka, Japan*. Resuscitation 2006 May;69(2):221-8. (<http://www.ncbi.nlm.nih.gov/pubmed/16519986>)

APPENDIX A

Emergency medical services response time and mortality in an urban setting